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LII. An Account of a pure native crystallised Natron, or fossil alkaline Salt, which is found in the Country of Tripoli in Barbary : By Donald Monro, M. D. Physician to the Army, and to St. George's Hospital, Fellow of the Royal College of Physicians, and of the Royal Society.

Read Dec. 19, 1771. **I**T is well known that the nitre, or natron, of the antients, which they used for making of glass (*a*), and in their baths (*b*), and for other purposes, was not the salt which now goes by the name of nitre, or saltpetre ; but a salt of an alkaline nature, which, at present, is commonly called the natron of the antients, or the fossil alkali.

(*a*) See an account of the making of glass with nitre and sand in C. Plinii Secundi Hist. natural. Tom. III. lib. xxxvi. cap. 26, —and an account of its medicinal virtues, *ibid.* lib. xxxi. cap. 10. —And Tacitus, in mentioning the river Belus in India, says, “ Circa cuius os collectæ arenæ, admixto nitro, in vitrum exco-“ quuntur.” *Lib. v. Hist. sect. 7.*

(*b*) Nitre is mentioned as used in baths, in several parts of the Holy Scripture, particularly by the prophet Jeremiah. See chap. ii. ver. 22. The nitre, or natron, is likewise taken notice of by many other of the ancient authors.

The

The knowledge of it was entirely lost for several centuries, but was revived in the last, by the Honourable R. Boyle, formerly a distinguished member of this Society, who, in his Short Memoirs for the natural experimental History of Mineral Waters (*c*), after telling us that it is of an alkaline nature, says, “ that he had some of it brought from Ægypt, and “ a neighbouring country, whose name he did not “ remember.”

However, it was afterwards neglected, and its properties as a distinct species of alkaline salt not known for many years; for although chemists observed, that a Glauber salt and cubic nitre were formed by dislodging the marine acid from sea salt, by means of the vitriolic and nitrous acids; and from thence suspected that there was something particular in the basis of this salt; yet its true nature was not discovered till Mons. du Hamel du Monceau gave an account, in the Memoirs of the French Royal Academy of Sciences for the year 1736, of his having obtained it pure, in two different ways. 1st, By dislodging the marine acid by means of the vitriolic, and then separating it by the addition of a phlogiston, and forming a hepar sulphuris, from which he precipitated the sulphur by means of the vegetable acid, and then separated this acid from the basis of sea salt by the force of fire. 2dly, By dislodging the marine acid from the sea salt by the addition of the nitrous, and so forming a cubic nitre, from which he dislodged the acid, by deflagrating it with charcoal;

(c) See his Notes on Title 26, page 86, of the edition printed at London 1684-5.

and then he purified the remainder by dissolving it in water, and by filtrating and evaporating the liquor and crystallising the salt.

After he had obtained the basis of sea salt quite pure, he tried a number of experiments with it, and with the natron of Egypt ; and found that they were entirely of the same nature, and that they were of a distinct species of alkaline salt, different in their properties from the potash, and other alkaline salts, commonly obtained by burning wood, and most other vegetable substances ; and that they formed different neutral salts with the three mineral acids, and with the vegetable.

This salt is likewise got from burning the Barilla, the Kali, and other marine plants ; and all that is at present used in this country, by our manufacturers, has been prepared in this manner.

Hitherto it has not been found native in the western parts of Europe, except in mineral waters, and in the neighbourhood of volcanoes, or at places where they are alledged to have existed formerly ; but it has long been found in Egypt, and near to Smyrna, and in other eastern countries, commonly mixed with earth, in a floury or concrete form ; in some places pretty pure, in others more mixed (d).

In the year 1764, a respectable member of this Society, Dr. Wm. Heberden, gave an account of a salt of this kind, which was found on the Pic of Tenerif, where there is a volcano, and added several very ingenious experiments of the Honourable Henry Ca-

(d) See Hoffman. Phys. Chem. lib. ii. obs. 1.—Geoffroy, Mater. Medica, part i. cap. 2.—Dr. Shaw's Travels, Excerpt. pag. 55. and other authors.

vendish, to prove that the vegetable alkali has a greater affinity with acids than the fossil or natron.

It is probable, that this salt got at the Pic of Tenerif is the basis of sea salt, whose acid has first been dislodged, either by the force of fire, or by the acid of decomposed sulphur, which has afterwards been attracted by a fresh phlogiston, and both separated by the force of fire; though it is not at all impossible but that there may be magazines of this fossil salt lodged native in the bowels of this mountain.

Hitherto we have no account, that I know of, of its being found any-where native in a crystalline form, and in large quantity; and therefore I imagined that the following history would be agreeable to the Society.

In the year 1765, Mrs White, widow to the late Consul White of Tripoli, on her return to this country, shewed me a substance which, she said, had a very particular property of bubbling up, or fermenting, when mixed with lemon juice. Immediately, on seeing and tasting it, I suspected it to be a pure native natron, or fossil alkali; and was confirmed in this opinion, by mixing it with different acids; and I have since had a few pounds of it sent home to me, and some gentlemen in the city have imported some hundred weight of it.

On enquiring into the history of this salt, I was told that it was brought yearly to Tripoli, in large quantities, from the mountains in the inland part of the country, and that it went by the name of Trona; that the inhabitants sometimes took an ounce, or more of it, by way of physic, and that it commonly operated both as an emetic and purgative medicine; that

that the principal use they made of it, was to mix it with their snuff, to give it, what they think, an agreeable sharpness; and that it was yearly sent to Constantinople, in large quantity, to be employed for the same purpose. But, so far as I can learn, the Turks are entirely ignorant of its nature, and employ it for no other uses.

It is well known that this salt does not run *per deliquium*, but falls down into a white floury powder, when exposed to the air; and that it makes a harder and firmer soap than the common vegetable alkali, and is alledged to make a purer and a finer glass.

This salt, which I have the honour now to present to the Society, is extremely pure, dissolves entirely in water, leaving only a small quantity of a reddish earth behind. I tried what quantity of acid an ounce of this salt would saturate, and found that it saturated as much as near two ounces and a half of the common gross barilla, in the form it is commonly imported. I had it likewise tried by callico printers, and it was found to answer all their purposes, and nearly in the same proportion with respect to the gross barilla, as above-mentioned, and I was told that it was thought to answer better than any other salt they had ever tried.

Most of the neutral salts made with this alkali and acids (except the cubic nitre) keep long without running *per deliquium*, even those made with vegetable acids; for most of the neutral salts made with vegetable acids, and with some of the salt now before you, which I had the honour to present to this Society in the year 1767, still remain entire, though

kept only in a close drawer, in the same tea-cups and small basons, without any cover, as they were shewn to the Society.

I have not hitherto been able to learn in what particular place of the inland part of Tripoli in Barbary this salt is found, nor how it is disposed of in the bowels of the earth : but it should seem to run in thin veins, of about half an inch, or a little more thick, in a bed of sea salt ; for all of it that has hitherto been imported into this country is covered with sea salt on each side. The one side is always smoother than the other, and appears as if it had been the basis on which it rested ; the other, which should seem to be the upper side, is rougher, by the shooting of the crystals. The pieces of the thin veins appear almost as if the salt had been dissolved in water, and afterwards boiled up into thin crystallised cakes, only that the crystals are much smaller, and disposed in a manner that cannot easily be imitated by art ; for when this salt is dissolved, and evaporated to a pellicle, and left to crystallise, it always shoots into crystals resembling those of Glauber salt.

Brown paper dipt into a solution of this salt, after it is dry burns almost as if it had been dipped in a solution of true nitre, as Dr. Heberden had observed of the salt got at the Pic of Tenerif ; which shews, that it contains more of an inflammable principle than the common vegetable alkali.

There are great mines of sea salt in the country of Tripoli, the salt of which should seem to contain a large proportion of this natron ; for, I am told, that all the meat salted with it acquired a red colour.

This native alkaline salt having never been subjected to the force of fire, is perfectly mild, and contains

tains no caustic parts, as the barilla, and the common potashes prepared by burning wood and plants, or the salts thrown out by volcanoes commonly do ; and therefore, it will be found to be much more useful for bleaching and washing linens, and for cleaning and scouring cotton or woollen stuffs, and for many other purposes, than any other alkaline salt hitherto known, at the same time that it will answer every purpose for which the other kinds of the fossil alkali are employed

When this salt is to be used for making rochelle or other neutral salts, or for washing or bleaching linen, it ought first to be dissolved in pure water, and the solution be allowed to stand for some time, till the reddish or brown earth has all precipitated to the bottom, and then the pure liquor ought to be poured off, and what remains at the bottom be thrown into a filter ; for, if this precaution is not taken, the reddish earth is in danger of giving a slight brown or reddish colour to the neutral salts, or to affect the colour of the linen.